

REMARKS

This application has been reviewed in light of the Office Action dated August 6, 2003. Claims 1-10 and 16-30 are presented for examination. Claims 1, 10, and 20 have been amended to define more clearly what Applicant regards as his invention. Claims 26-30 have been added to provide Applicant with a more complete scope of protection. Claims 1, 10, 20, and 26 are in independent form. Favorable reconsideration is requested.

Claims 1 and 6-9 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,770,918 (*Kawate*), and Claims 2-5 were rejected under 35 U.S.C. § 103(a) as being obvious over *Kawate* in view of U.S. Patent No. 6,135,839 (*Iwase*).

Claim 1 is directed to an electron-emitting apparatus comprising an electron-emitting device including a first electrode, a second electrode that is provided so as to be insulated from the first electrode, and an electron-emitting film attached to the second electrode and insulated from the first electrode. An anode is provided at a predetermined distance from the electron-emitting film, wherein the first electrode, the second electrode, and the electron-emitting film oppose the anode, such that a distance between the anode and the electron-emitting film is longer than a distance between the anode and the second electrode, and a distance between the anode and the first electrode is longer than the distance between the anode and the electron-emitting film.

Kawate discloses an electroconductive frit that includes glass having a low melting point and a filler of fine glass particles coated on the surface with metal. The electroconductive frit is used for bonding a spacer to an electron source substrate and a face plate in an image-forming apparatus to ensure mechanical securing strength and electrical connection.

The Office Action refers to Fig. 2 of *Kawate*, where the electron-emitting device has first electrode 2, second electrode 3, an electron emitting region 5, and electroconductive film 4. The first electrode 2 and second electrode 3 do not directly electrically contact electron-emitting region 5, but instead indirect contact is established through electroconductive film 4. In contrast, amended Claim 1 does not have an electroconductive film connecting the electrode(s) to the electron emitting region. Rather a notable feature of Claim 1 is that the electron-emitting film is directly electrically connected to the second electrode. See, for example, Fig. 1.

Furthermore, Claim 1 is patentably distinguishable over *Kawate* since the electroconductive film of *Kawate* is not insulated from either the first or second electrodes. The electron-emitting device recited in amended Claim 1, on the other hand, requires that the electron-emitting film be insulated from the first electrode. This is further demonstrated in the present specification for example, in Fig. 1, where electron emitting film 15 is shown directly contacting second electrode 14, and the electron emitting film 15 is insulated from first electrode 12.

As such, Claim 1 is deemed clearly patentable over *Kawate*, and Applicant respectfully requests that the rejection based on *Kawate* pursuant to 35 U.S.C. 102(b) be withdrawn.

Claims 10, 18, and 19 were rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,185,554 (*Nomura*) in view of U.S. Patent No. 5,973,444 (*Xu*). For at least the reasons stated below, these rejections are respectfully traversed.

Independent Claim 10 is directed to an electron-emitting device comprising a first electrode arranged on a surface of a substrate, an insulating layer arranged on the first electrode, a second electrode arranged on the insulating layer, and a film. The film is comprised of fibers including carbon as a main ingredient arranged on the second electrode, each fiber including graphenes stacked along an axial direction of the fiber. The second electrode has two side surfaces that oppose each other in a direction substantially parallel to the surface of the substrate, and the electron-emitting film is arranged so as to be shifted close to one of the two side surfaces.

The Office Action states that *Nomura* discloses in Figs. 4d and 4e, a first electrode arranged on the surface of a substrate, an insulating layer arranged on the first electrode, a second electrode arranged on the insulating layer, and an electron emitting film arranged on the second electrode. The electron emitting film consists of an organic palladium compound electron emitter and the second electrode has two side surfaces that oppose each other in a direction substantially parallel to the surface of the substrate and arranged so as to be shifted to be close to one of the two side surfaces.

However, as the Examiner correctly points out, nothing is *Nomura* would disclose or suggest a film comprised of fibers including carbon as a main ingredient, where each fiber includes graphens stacked along an axial direction of the fiber, as recited in Claim 10. See e.g., Fig. 20 of the present application.

Xu is cited by the Examiner for teaching carbon fiber emitters, which include multiple-walled tubular structures arranged on an electrode to improve emission characteristics. The multiple-walled tubular structures are alleged to be multi-walled nanotubes. According to Applicant's understanding, multi-walled nanotubes have a smaller diameter cylindrical graphen disposed in a larger diameter cylindrical graphen in a coaxially arrangement. Claim 10, on the other hand, requires that the graphens in a fiber be stacked along an axial direction of the fiber. Thus, the teachings of *Xu* are not helpful in establishing a prima facie case of obviousness.

Since neither *Nomura* nor *Xu* teaches or suggests that each fiber includes graphens stacked along an axial direction of the fiber, as recited in Claim 10, Claim 10 is deemed clearly patentable over *Nomura*, *Xu*, whether considered separately or in combination.

Claims 16, 17, and 20-25 were rejected under 35 U.S.C. § 103(a) as being obvious over *Nomura* in view of *Xu* and further in view of *Iwase*. Applicant respectfully traverses this rejection.

As amended, Claim 20 is directed to an electron emitting-apparatus comprising a first electrode arranged on a surface of a substrate, an insulating layer

arranged on the first electrode, a second electrode arranged on the insulating layer, a film comprising fibers, including carbon as a main ingredient, arranged on the second electrode, and an anode disposed at a distance from the film, the first electrode, the insulating layer, the second electrode, and the substrate. A first power source applies a necessary electric field, to cause an electron emission from the fibers, between the anode and the second electrode. A second power source applies a necessary electric field to stop the electron emission from the fibers, between the first electrode and the second electrode.

Nomura and *Xu* were discussed above.

The Examiner points to Fig. 10 of *Iwase* for disclosing an electron-emitting device wherein a voltage is applied between an electron emitting film (cathode electrode) 2 and a gate electrode (first gate electrode 4 and a second gate electrode 16) to extract the electron from an edge of the cathode electrode (see col. 11, line 45-col. 12, line 4). *Iwase* also suggests replacing this type of electron-emitting device with another electron-emitting device of FED shown in Fig. 29 comprising the electron-emitting device consisting of elements 101, 102, 103, 106 and 110, and, a phosphor 112 and an anode 111 over the electron-emitting device. Thus, the device disclosed in *Iwase* is the type that extracts the electron from the cathode 2 by the gate electrodes 4 and 16, and irradiates the extracted electron onto the anode electrode 111. Therefore, the device of *Iwase* and also the devices of *Nomura* and *Kawate* are not those which emit the electron from the second electrode (cathode) into a vacuum space by the electric field between the anode and the second electrodes.

Indeed, none of the references relied on by the Examiner, i.e., *Nomura*, *Kawate* and *Iwase*, discloses or suggests a first power source for applying a necessary electric field between the anode and the second electrode, to cause an electron emission from the fibers, as recited in Claim 20. As shown in Fig. 3, for example, a voltage is applied between a second electrode 14 and an anode 16 to generate an electric field for extracting an electron from a fiber in a film 15 including carbon as a main ingredient, arranged on the second electrode.

Accordingly, Claim 20 is deemed clearly patentable over those references, whether considered separately or in combination.

Independent Claim 26 recites features that are similar in many relevant respects to those of Claim 20 emphasized above, and also is believed to be patentable over the references relied on by the Examiner for substantially similar reasons as those set forth above with respect to Claim 20.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

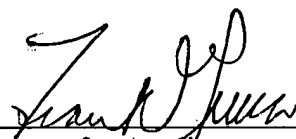
This Amendment After Final Rejection is believed clearly to place this application in condition for allowance and its entry is therefore believed proper under 37 C.F.R. § 1.116. In any event, however, entry of this Amendment After Final Rejection, as

an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, the Examiner is respectfully requested to contact Applicant's undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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